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Docket No.: M4065.0248/P248-C
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Allen McTeer

Application No.: 10/656,182

Confirmation No.: 8422

Filed: September 8, 2003

Art Unit: 2815

For: A MULTI-LAYERED COPPER BOND PAD
FOR AN INTEGRATED CIRCUIT

Examiner: E. Lee

APPELLANT'S REPLY BRIEF UNDER 37 C.F.R. § 41.41

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Reply Brief is filed pursuant to 37 C.F.R. § 41.41 and is responsive to the Examiner's Answer mailed December 3, 2007 in connection with the appeal from the final rejection of claims 74-80, 82 and 83 in the above-identified U.S. patent application.

I. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 9 claims pending in the application.

B. Current Status of Claims

1. Claims canceled: 1-73 and 81
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 74-80, 82 and 83

4. Claims allowed: None

5. Claims rejected: 74-80, 82 and 83

C. Claims On Appeal

The claims on appeal are claims 74-80, 82 and 83.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. The rejection of claims 74 and 75 under 35 U.S.C. 103(a) as being unpatentable over Okada (U.S. Patent No. 6,424,036) ("Okada") in view of Tsai et al. (U.S. Patent No. 6,479,389) ("Tsai").

B. The rejection of claims 76-78 under 35 U.S.C. 103(a) as being unpatentable over Okada and Tsai and further in view of Hsu et al. (U.S. Patent No. 5,661,082) ("Hsu").

C. The rejection of claims 79, 80, 82 and 83 under 35 U.S.C. 103(a) as being unpatentable over Edelstein et al (U.S. Patent No. 6,457,234) ("Edelstein") in view of Harada et al. (U.S. Patent No. 5,565,378) ("Harada") in view of Mahulikar et al. (U.S. Patent No. 5,320,689) ("Mahulikar").

III. ARGUMENT

Appellant writes briefly here to respond to the Examiner's remarks regarding Appellant's Appeal Brief. Appellant incorporates its comments from its Appeal Brief, dated April 2, 2007 (amended on June 12, 2007). Appellant provides the following comments in response to the Examiner's arguments on pages 9-12 of the Examiner's Answer.

With respect to claim 74, and in response to pages 9-10 of the Examiner's Answer, Appellant again respectfully submits that the cited combination does not disclose, teach or suggest a copper bond pad for a semiconductor device including a "dielectric layer," a "barrier layer," a "copper layer having titanium implanted within and near only an upper surface of said copper layer, said copper layer being primarily copper and having a thickness of about 500 Angstroms to about 20,000 Angstroms," and an "insulating layer over said copper layer" where

the “implanted titanium acts to reduce formation of copper oxide on said copper layer,” as recited in claim 74.

The Examiner argues at page 9 that claim 74 “does NOT state that the titanium can not eventually diffuse throughout the copper layer but only that, when it is formed, it is only implanted within and near only an upper surface of said copper layer.” (emphasis in original). However, Applicant respectfully submits that this is irrelevant. The Examiner relies on the assertion that the claim contains a product-by-process limitation. However, even if this were true, the claimed structure recites that titanium is both “within” and “near only an upper surface” of the copper layer. Tsai shows that either titanium is “applied ONLY to the top surface” (e.g., not within) or that “the copper alloy forms throughout the entire depth of the copper layer.” Examiner’s Answer at page 9. Tsai, therefore, cannot disclose both of the above structural limitations, since in order to do so, the titanium must be both “within and near only an upper surface of said copper layer.”

Additionally, it is well settled that during examination claims are to be given their “broadest reasonable interpretation consistent with the specification.” *In re American Academy of Science Tech. Center*, 367 F.3d 1359, 1364 (Fed. Cir. 2004) (emphasis added). If the claims of the present application are interpreted in light of the specification, it would become clear that they do not allow for a situation in which the titanium eventually diffuses throughout the copper layer. It is important that the implanted titanium be only near an upper surface (e.g., thickness of less than 1000Å, and more preferably 50Å to 100Å) so that the side effects of the implantation are minimal. Specification, page 11, line 20 – page 12, line 6. Therefore, one skilled in the art would not think that the titanium could eventually diffuse throughout the copper layer and still meet the limitations of the claimed invention.

Regarding claims 79, 80, 82 and 83, the Examiner argues that Appellant’s position regarding the combinability of the Edelstein, Harada and Mahulikar references is unpersuasive. Examiner’s Answer at page 11. Applicant respectfully submits, however, that the Examiner’s position that “Edelstein, Harada and Mahulikar are properly combinable because they all relate

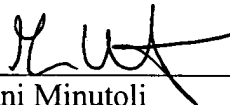
to improving the properties (i.e. resistance) of a copper material” is conclusory and misleading. As previously discussed by Applicant in the Appeal Brief, Harada does not relate to improvement of copper, but instead relates to the improvement of an aluminum film by adding elements to the aluminum. The Examiner argues that because Harada discloses copper and titanium being added in small amounts to aluminum to improve the properties of the aluminum, then one skilled in the art would be motivated to add titanium to copper to improve the properties of copper. Examiner’s Answer at pages 10-11. If the Examiner’s stated motivation to combine is that the references “all relate to improving the properties (i.e. resistance) of a copper material,” then the references should all actually relate to improving the properties of copper.

IV. CONCLUSION

For the foregoing reasons, Appellant respectfully submits that the claimed invention is not rendered obvious by the cited combination of references, and reversal of the final grounds of rejection is respectfully solicited.

Dated: February 1, 2008

Respectfully submitted,

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